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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/945,241	08/31/2001	Fumiaki Matsushima	93191-000277	1301

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EXAMINER

NGUYEN, HA T

ART UNIT PAPER NUMBER

2812

DATE MAILED: 09/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/945,241

Applicant(s)

MATSUSHIMA ET AL.

Examiner

Ha T. Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 08 July 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1,3-6,9-14,30,31,34-41 and 44-49 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3-6,9-14,30,31,34-41 and 44-49 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Notice to applicant***

1. Applicants' amendment and response to the Office Action mailed March 31, 2005 have been entered and made of record.

### ***Claim Objections***

2. Claims 1-3, 4 are objected to for the following informalities: in claims 1, 3, 4, lines 7, 7, and 6, respectively, substitution of "within" with –exposed in – and moving "while the resist layer exists" in lines 10-11, 11, and 10, to before "so" in lines 10, 10, and 9, respectively, are suggested for correctness.

Claims 5-6, 9-14, 30-31, 34-41, and 44-49, variously depend from claims 1, 3, or 4, they are objected for the same reason.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 1038 and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1, 3-5, 30, and 40 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Mizuta (USPN 5965943) in view of Yoshiaki et al. ( JPN 01-191451, hereinafter "Yoshiaki"), Hikari (JPN 09-017795), or Natsuya (JPN 07-066207).

[Re claim 1] Referring to Figs. 1-6 and related text, Mizuta discloses a method of forming a bump comprising the steps of: (a) preparing a pad 2 covered with an insulating layer 3; (b) forming a resist layer 11 on the insulating layer to have a through-hole located over the pad, the resist layer having an inner surface to define the through-hole; (c) forming an opening 3a in the insulating layer within the through-hole to expose at least a part of the pad after step (b); (d) forming a metal post 5 on the pad conforming to a shape of the through-hole. But it fails to disclose expressly the inner surface having a portion projecting inwardly in the through-hole and forming the metal post while the resist layer exists so as to have a side surface having a recess formed therein. However, the missing limitations are well known in the art because Yoshiaki discloses these features (see Figs. 1 (c)-2(b)). An ordinary artisan is motivated to combine Mizuta with Yoshiaki to improve connecting reliability (see Yoshiaki, Purpose).

[Re claim 3] Referring to Figs. 1-6 and related text, Mizuta discloses a method of forming a bump comprising the steps of: (a) preparing a pad 2 covered with an insulating layer 3; (b) forming a resist layer 11 on the insulating layer to have a through-hole located over the pad; (c) forming an opening 3a in the insulating layer within the through hole to expose at least a part of the pad after step (b); (d) forming a metal post 5 on the pad conforming to a shape of the through-hole. But it fails to disclose the forming of the metal post while the resist layer exists so that the metal post is not higher than the resist layer and the metal post has a hole exposing the pad. However, the missing limitations are well known in the art because Natsuya discloses these features (see Figs. 1 and 3 F). An ordinary artisan is motivated to combine Mizuta with Natsuya to control the positioning of solder bump.

[Re claim 4] Mizuta discloses substantially the limitations of claim 4, as shown above. But it fails to disclose the forming of a plurality of holes and metal posts while the resist layer exists so as to form a space between the metal posts. However, the missing limitations are well known in the art because Hikari discloses these features (see Figs. 1-2(c)). An ordinary artisan is motivated to combine Mizuta with Hikari to obtain solder bump with protection against cracking by a simple method (see Hikari , Purpose).

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[Claims 5, 30, and 40] Mizuta also discloses wherein the metal post comprises a first metal post 8 and second metal post 5, wherein the second metal post is formed on the first metal post (see Fig. 6), in the combined teaching of Mizuta and Yoshiaki the first metal post is formed while the resist layer exists.

5. Claims 6, 31, and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mizuta in view of Yoshiaki, Hikari, or Natsuya, as applied above, and further in view of Dion (USPN 5130275).

The combined teaching of Mizuta and Yoshiaki, Hikari, or Natsuya discloses substantially the limitations of claims 6, 31, and 41, as shown above.

But it fails to expressly disclose forming the second post after the resist is removed.

However Dion discloses this feature (see Figs 9-11).

An ordinary artisan is motivated to combine Mizuta and Yoshiaki, Hikari, or Natsuya with Dion to have better control of the size of the metal post.

Therefore, it would have been obvious to combine Mizuta and Yoshiaki, Hikari, or Natsuya with Dion to obtain the invention as specified in claims 6, 31, and 41.

6. Claims 9-14, 34-39, and 44-49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mizuta in view of Yoshiaki, Hikari, or Natsuya with or without Dion, as applied above, and further in view of Watanabe et al. (USPN 6218281, hereinafter "Watanabe").

The combined teaching of Mizuta with the applied references discloses substantially the limitations of claims 9-14, 34-40, 42, and 44-49, as shown above.

But they fail to disclose expressly wherein the first and second metal posts are formed by electroless plating; wherein the first metal post is formed of a material containing nickel; and wherein the second metal post is formed of a material containing gold.

However, the missing limitations are well known in the art because Watanabe discloses these features (See Figs. 4A, 7B and col. 9, lines 22-51).

A person of ordinary skill is motivated to modify the combined teaching of Mizuta with the applied references with Watanabe to use electroless plating for reduction of production cost

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and to use Ni and Au as materials for the first and second metal layers to obtain better adhesion and better reliability.

Therefore, it would have been obvious to combine the combined teaching of Mizuta with the applied references with Watanabe to obtain the invention as specified in claims 9-14, 34-39, and 44-49.

### *Response to Amendment*

7. In view of applicants' amendment to the claims, the objection to claims 5, 6, and 30-49, for informalities, has been withdrawn.

In view of applicants' cancellation of the claims, the rejection of claims 7-8, 15, 17, 32-33, and 44-43 under 35 U.S.C. 102 or 103 have been rendered moot.

In view of applicants' amendment to the claims, the rejection of claims 1, 3-6, 9-14, 30-31, 34-41, and 44-49 under 35 U.S.C. 102 or 103, as stated in the indicated Office Action, have been withdrawn.

In view of the new ground of rejections, applicants' arguments have been rendered moot.

### *Conclusion*

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP, 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for response to this final action is set to expire **THREE MONTHS** from the date of this action. In the event a first response is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event will the statutory period for response expire later than **SIX MONTHS** from the date of this final action.

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9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ha T. Nguyen whose telephone number is (571) 272-1678. The examiner can normally be reached on Monday-Friday from 8:30AM to 6:00PM, except the first Friday of each bi-week. The telephone number for Wednesday is (703) 560-0528.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael S. Lebentritt, can be reached on (571) 272-1873. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Ha Nguyen

Primary Examiner

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